

CLAIMS

WHAT IS CLAIMED IS:

1. A method for optimizing electromagnetic energy in a system for processing an image of an object in order to perform a procedure on an object, comprising the steps of:

- 5 (a) applying to an object a plurality of light beams formed of incoherent light at a plurality of differing frequencies and reflecting said plurality of applied incoherent light beams from said object to provide a plurality of reflected light beams;
- 10 (b) providing a corresponding plurality of electrical signals representative of the reflected light beams of said plurality of reflected light beams;
- (c) determining a corresponding plurality of image quality metrics in accordance with said plurality of electrical signals;
- (d) determining a corresponding plurality of images in accordance with said plurality of image quality metrics;
- 15 (e) selecting an image of said plurality of images in accordance with a predetermined image criterion to provide a selected image;
- (f) determining a frequency of said plurality of differing frequencies in accordance with said selected image to provide a determined frequency; and
- 20 (g) performing said procedure on an object in accordance with said determined frequency.

2. The method for optimizing electromagnetic energy of Claim 1, comprising the further step of determining a plurality of frequency distributions in accordance with said plurality of differing frequencies.

25 3. The method for optimizing electromagnetic energy of Claim 2, comprising the further step of determining a plurality of image quality metrics in accordance with said plurality of frequency distributions.

4. The method for optimizing electromagnetic energy of Claim 3, comprising the further step of optimizing an image of said plurality of images.

30 5. The method for optimizing electromagnetic energy of Claim 1, wherein said predetermined image criterion is selected in accordance with the light absorption properties of a selected tissue.

6. The method for optimizing electromagnetic energy of Claim 5, wherein said

selected tissue comprises tumor tissue.

7. The method for optimizing electromagnetic energy of Claim 5, wherein said selected tissue comprises lesion tissue.

8. The method for optimizing electromagnetic energy of Claim 5, wherein said
5 selected tissue comprises blood tissue.

9. The method for optimizing electromagnetic energy of Claim 5, wherein said predetermined image criterion is selected in accordance with the light absorption properties of a tissue pathology.

10. The method for optimizing electromagnetic energy of Claim 5, comprising the
10 further step of locating said selected tissue in an eye of a patient in accordance with determined frequency.

11. The method for optimizing electromagnetic energy of Claim 5 comprising the further steps of:

(a) applying a further light beam of said determined frequency to a selected
15 tissue; and

(b) performing surgery upon said selected tissue in accordance with said further light beam.

12. The method for optimizing electromagnetic energy of Claim 5, wherein said eye has a selected tissue feature comprising the further step of determining changes in said selected
20 tissue feature in accordance with said determined selected light frequency.

13. The method for optimizing electromagnetic energy of Claim 4, comprising the further step of applying said plurality of reflected light beams to a spatial light modulator and an image sensor to provide said plurality of signals representative of said reflected light beams.

14. The method for optimizing electromagnetic energy of Claim 13, further
25 comprising the step of determining said plurality of image quality metric in accordance with said signals representative of said reflected light as:

$$J = \int |F\{\exp[i\gamma I(x, y)]\}|^4 dx dy$$

where F is a Fourier transform and \tilde{a} is a parameter dependent upon a dynamic range of said reflected light beam.

15. The method for clarifying an optical/digital image of an object Claim 1,
30 comprising the further steps of:

- (a) applying to said object a superposition light beam and reflecting said superposition light beam from said object to provide a reflected superposition light beam;
- (b) providing a superposition image in accordance with said reflected superposition light beam; and
- (c) superimposing said selected image and said superposition image to provide a composite image

16. The method for clarifying an optical/digital image of an object of Claim 15, comprising the further step of performing said procedure in accordance with said composite image.

17. The method for clarifying an optical/digital image of an object of Claim 16, comprising the further step of applying said selected image and said superposition image to a superposition screen in order to provide said composite image.

18. The method for clarifying an optical/digital image of an object of Claim 17, wherein said object has a selected feature comprising the further step of optimizing at least one of said selected image and said superposition image to emphasize a visualization of said selected feature.

19. The method for clarifying an optical/digital image of an object of Claim 18, wherein said object is an eye comprising the further step of de-emphasizing a visualization of blood.

20. The method for clarifying an optical/digital image of an object of Claim 18, comprising the further step of adjusting an amount of emphasizing of said visualization during a performance of said procedure.

21. The method for clarifying an optical/digital image of an object of Claim 20, comprising the further step of adjusting an amount of emphasizing of said selected feature by adjusting the relative contributions of said selected image and said superposition image to said composite image.